

We claim:

1. A supported catalyst comprising:
a transition metal oxide; and
5 a transition metal aluminate.
2. The supported catalyst of claim 1, wherein the transition metal of the transition metal aluminate and transition metal oxide is selected from the group consisting of nickel, cobalt, copper, chromium, iron, manganese, 10 platinum, palladium, rhodium and ruthenium.
3. The supported catalyst of claim 2, wherein the transition metal is nickel.
4. The supported catalyst of claim 1, wherein the transition metal aluminate is from about 10% to about 90% by weight of the supported catalyst.
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5. The supported catalyst of claim 1 or 4, wherein the transition metal oxide is from about 10% to about 90% by weight of the supported catalyst.
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6. The supported catalyst of claim 1, further comprising a rare-earth metal oxide.
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7. The supported catalyst of claim 6, wherein the rare-earth metal oxide is selected from the group consisting of oxides of scandium, yttrium, lanthanum, lanthanide metals and mixtures thereof.
8. The supported catalyst of claim 7, wherein the rare-earth metal oxide is lanthanum oxide.
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9. The supported catalyst of claim 3, wherein the rare-earth metal oxide is lanthanum oxide.

10. The supported catalyst of claim 6, wherein the transition metal aluminate is from about 10% to about 60% by weight of the supported catalyst.

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11. The supported catalyst of claim 6 or 10, wherein the transition metal oxide is from about 10% to about 80% by weight of the supported catalyst.

12. The supported catalyst of claim 6, 11 or 12, wherein the rare-earth

10 metal oxide is from about 1% to about 10% by weight of the supported catalyst.

13. The supported catalyst of claim 10, wherein the transition metal aluminate is from about 30% to about 50% by weight of the supported

15 catalyst.

14. The supported catalyst of claim 11, wherein the transition metal oxide is from about 15% to about 30% by weight of the supported catalyst.

20 15. The supported catalyst of claim 12, wherein the rare-earth metal oxide is from about 0.5% to about 2% by weight of the supported catalyst.

16. The supported catalyst of any one of claims 1 or 6, comprising a mixture of transition metal alumina and transition metal aluminate.

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17. The supported catalyst of any one of claims 16, wherein the mixture of transition metal alumina and transition metal aluminate is in a ratio of from about 1:1 to about 1:4.

30 18. The supported catalyst of claim 6 further comprising at least one of a transition metal oxide-rare-earth metal, a rare-earth metal-aluminate, a metal oxide-rare-earth metal-aluminate, a rare-earth metal oxide-aluminate, a rare-

earth metal-alumina, a metal oxide-rare-earth metal-alumina, and a rare-earth metal oxide-alumina.

19. The supported catalyst of claim 1, wherein the supported catalyst has a
5 surface area of from about 10 m²/g to about 500 m²/g.

20. The supported catalyst of claim 1, wherein the supported catalyst has a
surface area of from about 140 m²/g to about 150 m²/g.

10 21. The supported catalyst of claim 6, wherein the supported catalyst
comprises peaks in the powder x-ray diffraction pattern having the following
20± values: 19.1° (± 0.2), 31.5° (± 0.2), 37.1° (± 0.2), 45.0° (± 0.2), 59.7° (±
0.2), 65.8° (± 0.2), 75.6° (± 0.2), 77.9° (± 0.2), and 83.0° (± 0.2).

15 22. The supported catalyst of claim 1 or 6, further comprising at least one
of a rare-earth metal aluminate and a rare-earth metal aluminide.

23. A supported catalyst comprising:

20 from about 10% to about 80% by weight of nickel oxide;
from about 1% to about 10% by weight of lanthanum oxide; and
from about 10% to about 60% by weight of nickel aluminate.

24. The supported catalyst of claim 23, further comprising at least one of a
lanthanum aluminate and a lanthanum aluminide.

25 25. A process for making a supported catalyst comprising:
combining a catalytic active component, a catalyst support optionally
containing a promoter therein, and an acid material to form a slurry;
adjusting the slurry to a pH of about 7 to about 8; and
30 recovering the supported catalyst from the slurry.

26. A process for making a supported catalyst comprising:

dispersing a catalytic active component within pores of a catalyst support, wherein the catalyst support optionally contains a promoter therein; and

5 converting the catalytic active component to an active metal complex intermediate at a pH of about 7 to about 8, the active metal complex intermediate coating surfaces of the catalyst support.

27. The process of claim 25 or 26, further comprising calcining the supported catalyst.

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28. The process of claim 27, wherein the supported catalyst is calcined at a temperature of from about 800°C to about 970°C.

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29. The process of claim 27, wherein the supported catalyst is calcined at about 960 °C.

30. The process of claim 27, 28 or 29, wherein the supported catalyst is calcined in the presence of an oxidizing gas.

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31. The process of claim 25, wherein the pH of the slurry is adjusted by adding a basic material to the slurry.

32. The process of claim 31, wherein the pH of the slurry is adjusted by adding a basic material to the slurry and heating the slurry.

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33. The process of claim 25 or 26, wherein the catalytic active component is a transition metal salt.

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34. The process of claim 33, wherein the transition metal salt is selected from the group consisting of transition metal oxides, transition metal nitrates, transition metal carbonates, transition metal oxalates, and transition metal formates.

35. The process of claim 33, wherein the transition metal of the transition metal salt is selected from the group consisting of nickel, cobalt, copper, chromium, iron, manganese, platinum, palladium, rhodium and ruthenium.

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36. The process of claim 35, wherein the transition metal is nickel.

37. The process of claim 25 or 26, wherein the catalyst support has an apparent porosity in the range of about 15% to about 80%.

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38. The process of claim 25 or 26, wherein the catalyst support has a mean pore diameter in the range of about 0.05 microns to about 20 microns.

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39. The process of claim 25 or 26, wherein the catalyst support is a ceramic.

40. The process of claim 25 or 26, wherein the catalyst support is selected from the group consisting of silica, magnesia, titania, zirconia, beryllia, thoria, zeolites, and calcium aluminates.

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41. The process of claim 35, 36 or 40, wherein the catalyst support is alumina.

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42. The process of claim 25 or 26, wherein the promoter is a rare-earth metal and/or rare-earth metal salt.

43. The process of claim 41, wherein the rare-earth metal is selected from the group consisting of scandium, yttrium, lanthanum, lanthanide metals and mixtures thereof.

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44. The process of claim 43, wherein the rare-earth metal is lanthanum.

45. The process of claim 42, 43 or 44, wherein the rare-earth metal salt is selected from the group consisting of rare-earth oxides, rare-earth nitrates, rare-earth carbonates, rare-earth hydroxides, rare-earth oxalates, and mixtures thereof.

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46. The process of claim 45, wherein the rare-earth metal salt is lanthanum oxide.

47. The process of claim 25, wherein the acid material is nitric acid.

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48. The process of claim 26, wherein the catalyst support is treated with an acid material.

49. The process of claim 25 or 26, wherein the pH is about 7.5.

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50. The process of claim 31 or 32, wherein the basic material is selected from the group consisting of ammonium hydroxides, metal hydroxides, and ethylene glycol.

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51. The process of claim 25 or 26, wherein the active catalytic component is from about 20% to about 80% by weight and the catalyst support optionally containing promoter is from about 20% to about 80% by weight based on the total weight of the active catalytic component and the catalyst support optionally containing promoter.

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52. The process of claim 51, wherein the catalyst support contains from about 1% by weight to about 20% by weight of the catalyst support

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53. The process of claim 25 or 26, further comprising reducing the supported catalyst.

54. The process of claim 53, wherein the supported catalyst is reduced

using hydrogen.

55. A supported catalyst formed by the process of claim 25 or 26.
- 5 56. The supported catalyst of any one of claims 1, 6, 22 to 24, and 55 for a steam reforming reaction.
57. The supported catalyst of claim 55 for an autothermal reforming reaction, wherein the promoter is present.
- 10 58. The supported catalyst of any one of claims 6 and 22 to 24 for an autothermal reforming reaction.
- 15 59. The supported catalyst of claim 55 for both a steam reforming reaction and an autothermal reforming reaction, wherein the promoter is present.
60. The supported catalyst of any one of claims 6 and 22 to 24 for both a steam reforming reaction and an autothermal reforming reaction.
- 20 61. The supported catalyst of any one of claims 1, 6, 22 to 24, and 55, wherein the supported catalyst is reduced.